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ABSTRACT

On the basis that one of the primary goals for an inservice institute introducing an innovative curriculum should be to change the participants' philosophy of teaching, this study analyzed the achievement of this goal in several inservice institutes designed to prepare teachers for implementing the Elementary Science Study (ESS) and the Science Curriculum Improvement Study (SCIS). A ten-item questionnaire was prepared with three alternatives for each item; one alternative presented the ESS philosophy; another, the SCIS philosophy; the third described a more structured but commonly used approach. Teachers and curriculum consultants in three institutes completed this questionnaire, both at the beginning and at the end of each institute. Results showed that participants tended to select the ESS philosophy at the end of the institutes. (MH)

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THE EFFECTIVENESS OF INSTITUTES FOR CHANGING THE PHILOSOPHY OF TEACHING ELEMENTARY SCHOOL SCIENCE

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THE EFFECTIVENESS OF INSTITUTES FOR CHANGING THE PHILOSOPHY OF TEACHING ELEMENTARY SCHOOL SCIENCE

Abstract

One of the primary goals for an inservice institute should be to change the participants' philosophy of teaching. The objective of this study is to analyze the achievement of this goal in institutes which were designed to prepare teachers for implementing the Elementary Science Study (ESS) and the Science Curriculum Improvement Study (SCIS). A ten-item questionnaire was prepared with three alternatives for each item. One alternative presented the ESS philosophy; another, the SCIS emphasis; the third alternative, a more structured but commonly used approach. The participants completed this questionnaire both at the beginning and at the end of each institute. Using the t-test on paired observations, the following null hypothesis was tested: there is no significant difference in the philosophy of teaching described on the questionnaire between the responses of participants before the institute and their responses after the institute. The 176 teachers in their SCIS scores accepted the null hypothesis. But their ESS scores showed a very significant change toward the philosophy of ESS. Eighty principals completed this questionnaire once and demonstrated a strong support of the SCIS philosophy. The teachers, especially at the end of the institute, very significantly selected a philosophy differing from that of the principals.

THE EFFECTIVENESS OF INSTITUTES FOR CHANGING THE PHILOSOPHY OF TEACHING ELEMENTARY SCHOOL SCIENCE

INTRODUCTION

Hurd and Gallagher (1968) observed that a condition important for "the duffusion of curriculum innovations into schools" is "the acceptance of the idea underlying the innovation, its rationale or philosophical assumption, and its contribution to accepted educational values." Therefore one of the primary goals for an inservice institute introducing an innovative curriculum should be to change the participants' philosophy of teaching. The objective of this study is to analyze the achievement of this goal in several inservice institutes which were designed to prepare teachers for implementing the Elementary Science Study (ESS) and the Science Curriculum Improvement Study (SCIS). Many research studies (Stronck, 1971; Stronck, 1974; Orlich & Ezell, 1975; etc.) have considered the effectiveness of inservice institutes in terms of teachers' performances, attitudes, and cognitive skills. This study directly seeks to identify the participants' acceptance of a philosophy as it is described in the literature.

Each of the new innovative projects in elementary school science has a clearly described philosophy. Hawkins (1965) explained the three phases of school work advocated by the ESS: 1. "Messing About" which is free and unguided exploratory work, 2. "Multiple Programmed" phase during which the teacher encourages the individuality of the child's work, and 3. "Theory" phase by which the teacher involves the students in discussion and argument. The philosophy of the ESS stresses an openness to the child's interests and originality.

Karplus and Lawson (1974) described the learning cycle of SCIS in

three stages: 1. "Exploration" by which children learn through their spontaneous reactions to a new situation; 2. "Invention" during which the teacher defines a new concept or explains a new procedure in order to expand the pupils' knowledge, skills, or reasoning; and 3. "Discovery" during which a child discerns new applications for the concept or skill he has learned recently. Because SCIS stresses the learning and use of some important scientific concepts, it seems to be more structured and traditional than ESS.

Both SCIS and ESS in recent years have been among the most popular projects for new adoptions in school districts throughout the United States. Those who serve on the adoption committees usually represent only a small fraction of the teachers who will be using the new project materials. In this study the average member of an adoption committee knew only slightly more about the philosophy and materials of ESS and SCIS than the other participants before the beginning of each institute.

PROCEDURES

A ten-item questionnaire was prepared with three alternatives for each item. Based on the wording in New Directions in Elementary Science Teaching (Hurd and Gallagher, 1968), one alternative presented the ESS philosophy; another, the SCIS emphasis; the third alternative described a more structured but commonly used approach. A single book was used to derive the questionnaire in order to follow closely the analysis of various science projects by Hurd and Gallagher. A typical item in the questionnaire is the following:

Teachers must:

A. plan carefully the behavioral objectives of each lesson.

B. accept the experiences of the children and then help them to understand their experiences.

C. encourage the children to try ways of using the materials which were never preplaned by the teacher.

Alternative A describes a common philosophy which is required in some school districts. Alternative B expresses the SCIS emphasis although SCIS does not exclude the approach found in alternative C. This last alternative emphasizes a central point in the philosophy of ESS.

Another item from the questionnaire is the following:

The subject content of elementary science courses should be:

A. basic process skills, e.g., observing, classifying, measuring, etc.

B. science concepts chosen for their wide applicability and potential usefulness.

C. experiences that are both interesting and enriching.

For this item, alternative A shows the philosophy of Science - A Process Approach, which is another excellent innovative curriculum. Alternative B reflects the theme of SCIS while the last alternative shows the orientation of ESS. The participants were asked to select only one alternative for each item. A score on the ESS alternatives could range from 0 to 10; similarly the SCIS score could range from 0 to 10.

Participants in three institutes completed this questionnaire both at the beginning and at the end of each institute. Because the participants wrote their names on the questionnaires, the pretest and posttest questionnaires could be paired. Using the t-test on paired observations, the following null hypothesis was tested: there is no significant difference in the philosophy of teaching described on the questionnaire between the responses of participants before the institute and their responses after the institute. This same null hypothisis was tested both for the ESS philosophy and for the SCIS philosophy.

SOURCES OF DATA AND DESIGN

All persons completing the questionnaire in this study were participants in summer institutes and conferences funded by the National Science Foundation and held at Washington State University. The first institute involved 36 teachers in a three-week program emphasizing the implementation of ESS with much time given to SCIS. The second institute had 140 teachers in a two-week program. Because of the large number of participants in this second group, they were divided into two sessions of two-weeks each. Both sessions received the same presentations from the same staff. This second institute was primarily on SCIS although some units of ESS were studied. Both the first and the second institutes were designed to assist teachers in using the innovative materials in their classrooms within a few months.

A third institute was for 25 curriculum consultants representing all of the intermediate school districts of the State of Washington. During this three-week institute, one week was devoted to each of the following projects: ESS, SCIS, and Science - A Process Approach. These curriculum consultants studied the projects for the purpose of assisting administrators and adoption committees in identifying appropriate curriculum materials and philosophies. Because the responsibilities and goals of this third group were greatly different from those of the first two groups, it could serve as a control in analyzing the impact of an institute on ESS and SCIS. Therefore, the design of the study is the pretest-posttest control group design -- a true experimental design as described by Campbell and Stanley (1963).

The same questionnaire was completed by 35 elementary school principals and 45 junior high school principals only at the beginning of "awareness" conferences. During the six days of these conferences six different innovative projects were described to the participants. The elementary

administrators considered both ESS and SCIS among the projects of their conference. Neither group of administrators completed the questionnaire as a posttest because of the assumption that the short conference would not change their philosophies. The purpose of the conferences was merely to acquaint the participants with the variety of innovative projects which were available for adoption. Nevertheless, their responses to the questionnaire were collected to consider the possible differences between their selections and those of teachers.

An additional 25 principals of elementary schools participated in a one-week institute on SCIS with some consideration of ESS. The principals were from the same large school district which provided the 140 teachers of the "second institute" in this study. These 25 principals were more concerned with administrative problems related to the implementation of the new projects than with the details of the curriculum materials. Nevertheless, their responses to the questionnaire serve as an additional group for comparisons.

RESULTS AND CONCLUSIONS

For their SCIS scores, the null hypothesis is accepted by both groups of teachers and by the curriculum consultants. But it is rejected by all three groups for the ESS scores. Teachers in the first institute significantly at the 0.01 level of confidence changed toward adopting the philosophy of ESS. Teachers in the second institute significantly at the 0.02 level of confidence also changed toward the ESS orientation. The greater significance of the change among teachers in the first institute can be explained by the fact that the first institute was more than fifty percent on ESS while the second institute considered ESS for less than one quarter of the time. The enthusiasm of the teachers for ESS supports the findings

of Jenkins (1971) who reported: "Teachers following the ESS approach were generally favorable toward the activities and materials provided while teachers in the other programs ranged from neutrality to dissatisfaction." The "other programs" included SCIS and Science - A Process Approach.

The curriculum consultants significantly at the 0.005 level of confidence moved away from the philosophy of ESS. Their rejection of the ESS philosophy was based on their recognition of administrative problems in implementing this innovative project. Until recently the authors of ESS provided little help in evaluating the child's performance. Because each ESS unit may be taught within a range of grades, a school district must make an arbitrary assignment of certain units to specific grades or allow the repetitious teaching of the same units in several grades. Some units are very inexpensive while others are relatively expensive in their use.

The curriculum consultants at the beginning of the institute held a philosophy similar to that of the two groups of teachers. Both the teachers and the curriculum consultants in their pretests selected ESS alternatives for more than one third of their responses and SCIS alternatives with a similar frequency. Table I provides the percentages for the selection of philosophies by participants in the three institutes.

INSERT TABLE I HERE

In the posttests the teachers continued to show similar patterns. But in the posttests on ESS the curriculum consultants significantly differed from the teachers at the 0.001 level of confidence. Different types of institutes (although taught by the same faculty and dealing with the same innovative projects) can produce significantly different results on

the questionnaire.

All groups of principals selected the SCIS philosophy for approximately half of the items and the ESS orientation for approximately one quarter of their responses. Table II gives the percentages for the selection of philosophies by the principals.

INSERT TABLE II HERE

There was no significant difference on SCIS scores between the elementary schools principals and the junior high school principals. Moreover there was no significant difference between the ESS posttest scores of the curriculum consultants and the ESS scores of the principals. Nevertheless, the pretest ESS scores of the curriculum consultants differed from the responses of the elementary school principals significantly at the 0.005 level of confidence. The impact of the institute was to change the opinion of the curriculum consultants toward agreement with the philosophy commonly held by these elementary school principals.

Even in the ESS pretest scores the teachers differed significantly from the responses of the principals. In their posttest scores on ESS, the teachers demonstrated a philosophy differing from that of the principals with significance at the 0.001 level. The inservice institute increased the distinction in philosophies between teachers and their principals.

RECOMMENDATIONS

This study demonstrated that institutes can be effective in increasing the frequency of responses by which teachers select the philosophy of ESS. Teachers should adopt the philosophy of a new curriculum if they intend to implement the materials as they were designed by the authors. One criterion for the success of an institute should be the extent to which the participants change their philosophy. In general, the trend toward the open philosophy

of ESS as expressed on the questionnaire of this study supports the basic goals of both ESS and SCIS in contrast with traditional instruction.

Because many principals prefer a more structured philosophy, the impact of an institute may be to increase the differences between teachers and their principals. One recommendation may be to provide a special workship designed especially for the principals. But data from the institute for curriculum consultants discourages the use of this type of solution. When administrators are allowed to interact with themselves, they tend to dwell on administrative problems and to remain apart from the instructional insights which teachers can strongly gain during an institute designed for the immediate implementation of the materials into the classroom. A better solution seems to be an institute which simply incorporates the principals with the teachers in studying the new materials. In this environment the principal will most likely emerge as a true leader in the implementation process and not remain as an unsympathetic spectator. Frequently the generous support of the principal is essential for the implementation of new science projects into the elementary schools.

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TABLE I

Percentages for selections of philosophies by participants in institutes.

	N	ESS		SCIS	
		Pretest	Posttest	Pretest	Posttest
1. Teachers studying mostly ESS	36	46.36	61 55	33.33	31.10
2. Teachers studying mostly SCIS	140	31.35	53.59	32.36	35.73
3. Curriculum Consultants	25	35.71	29.98	38.57	39.01

TABLE II

Percentages for selection of philosophies by principals.

	N	ESS	SCIS
1. Elementary principals in average conference	35	22.74	52.89
2. Junior High School principals in average conference	45	29.12	53.29
3. Elementary principals in workshop	25	26.02	52.13